CLAIMS

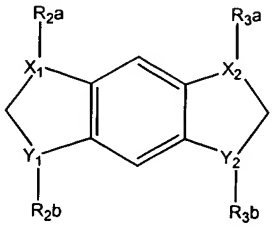
1. A fluorescent cyanine dye having the formula:

$$T_1 (–CH=)_{n1} A (–CH=)_{n2} T_2$$

wherein:

$n \geq 1$ and n_1 is the same as or different from n_2;

A comprises the formula:

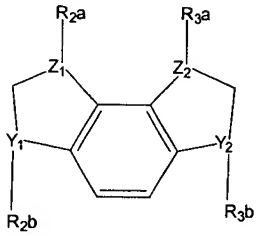


wherein:

X_1 and Y_1 are selected from the group consisting of $C(CH_3)_2$, CH=CH, O, N, S, Se and Te and either X_1 or Y_1 is N;

X_2 and Y_2 are selected from the group consisting of $C(CH_3)_2$, CH=CH, O, N, S, Se and Te and either X_2 or Y_2 is N; or

A comprises the formula:



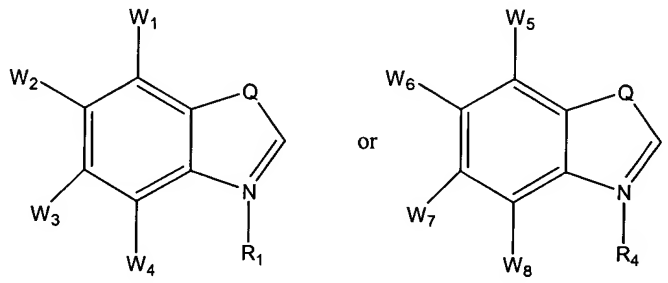
wherein:

Z_1 and Y_1 are selected from the group consisting of $C(CH_3)_2$, CH=CH, O, N, S, Se and Te and either Z_1 or Y_1 is N;

Z_2 and Y_2 are selected from the group consisting of $C(CH_3)_2$, CH=CH, O, N, S, Se and Te and either Z_2 or Y_2 is N; and

wherein a and b are 0 or 1, and a+b=1; and where X, Y or Z is N, R_2 and R_3 are substituents on N and are the same or different and are selected from the group consisting of H, methyl, ethyl, $C(CH_3)_2$ and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H; and wherein:

T1 and T2 are the same or different and have the formula:



wherein:

Q is selected from the group consisting of O, S, CH_2, (CH=CH) and $C(CH_3)_2$;

R_1 and R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H;

each of W_{1-8} is the same or different and may be H or a hydrophilic moiety;

at least one occurrence of W is a hydrophilic moiety; and

wherein at least one of R_1-R_4 has a reactive group.

2. The fluorescent cyanine dye of claim 1 wherein one or both of Y_1 and Y_2 are N.

3. The fluorescent cyanine dye of claim 2 wherein one or both of X_1 and X_2 are S.

4. The fluorescent cyanine dye of claim 2 wherein one or both of X_1 and X_2 are O.

5. The fluorescent cyanine dye of claim 2 wherein one or both of X_1 and X_2 are CH_2.

6. The fluorescent cyanine dye of claim 2 wherein one or both of X_1 and X_2 are (CH=CH).

7. The fluorescent cyanine dye of claim 2 wherein one or both of Y_1 and Y_2 are S.

8. The fluorescent cyanine dye of claim 1 wherein Z_1 and Y_2 are S.

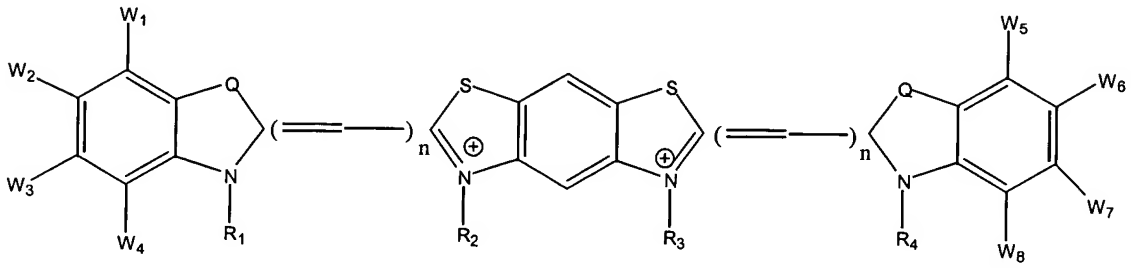
9. The fluorescent cyanine dye of claim 1 wherein Y_1 and Z_2 are S.

10. The fluorescent cyanine dye of claim 1 wherein Q is CH_2.

11. The fluorescent cyanine dye of claim 1 wherein Q is $C(CH_3)_2$.

12. A composition comprising a fluorescent cyanine dye of claim 1.

13. A fluorescent cyanine dye having the formula:



wherein:

$n \geq 1$;

Q is selected from the group consisting of O, S, CH_2, (CH=CH) and $C(CH_3)_2$;

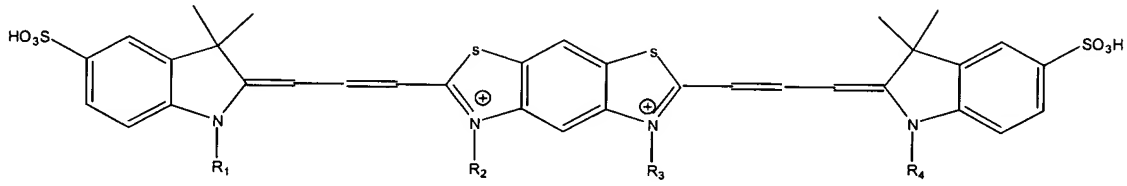
R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R1-R4 has a reactive group;

each of W_{1-8} is the same or different and may be H or a hydrophilic moiety; and

at least one occurrence of W is a hydrophilic moiety.

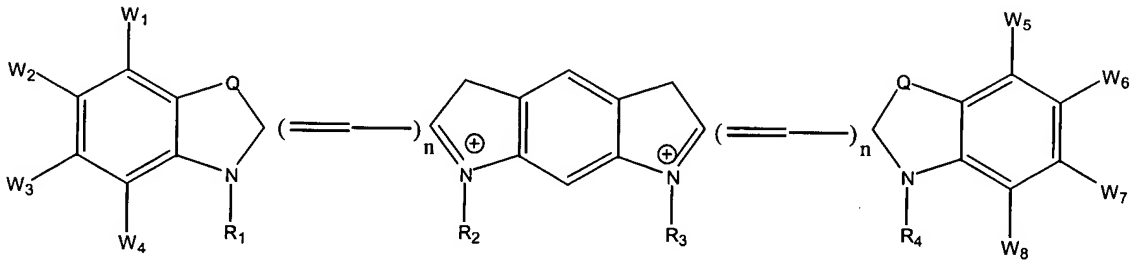
14. A composition comprising the dye of claim 13.

15. A fluorescent cyanine dye having the formula:



wherein R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R_1-R_4 has a reactive group.

16. A fluorescent cyanine dye having the formula:



wherein:

$n \geq 1$;

Q is selected from the group consisting of O, S, CH_2, (CH=CH) and $C(CH_3)_2$;

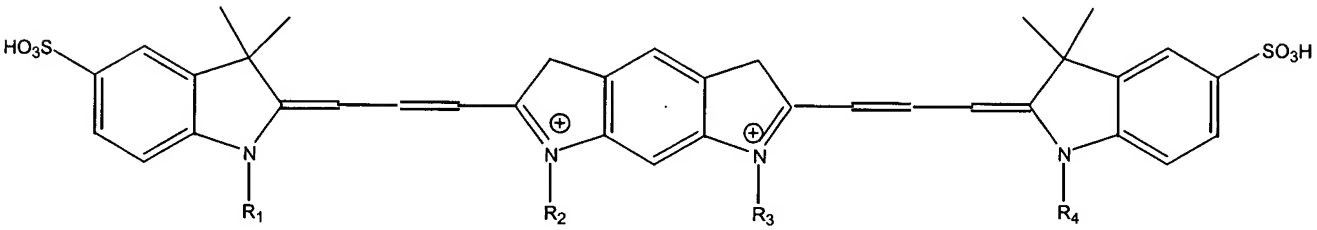
R1-R4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R1-R4 has a reactive group;

each of W_{1-8} is the same or different and may be H or a hydrophilic moiety; and

at least one occurrence of W is a hydrophilic moiety.

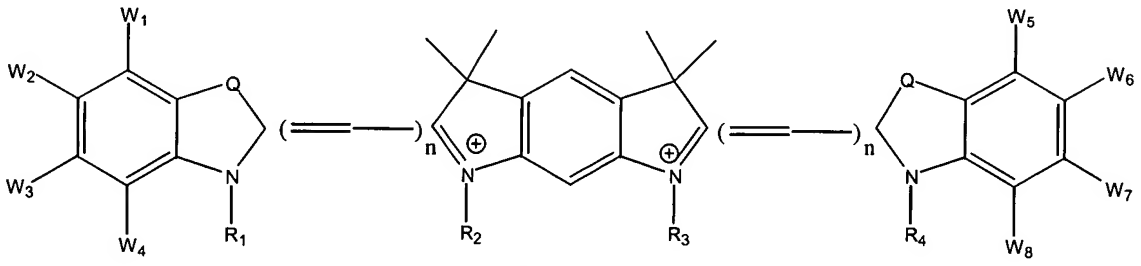
17. A composition comprising the dye of claim 16.

18. A fluorescent cyanine dye having the formula:



wherein R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R_1-R_4 has a reactive group.

19. A fluorescent cyanine dye having the formula:



wherein:

$n \geq 1$;

Q is selected from the group consisting of O, S, CH_2, (CH=CH) and $C(CH_3)_2$;

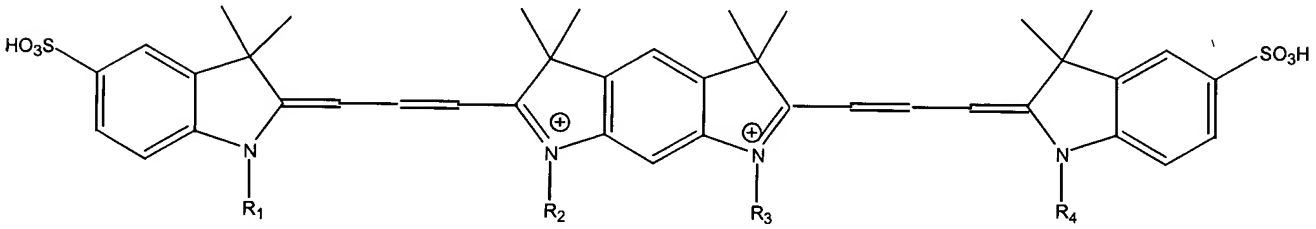
R1-R4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R1-R4 has a reactive group;

each of W_{1-8} is the same or different and may be H or a hydrophilic moiety; and

at least one occurrence of W is a hydrophilic moiety.

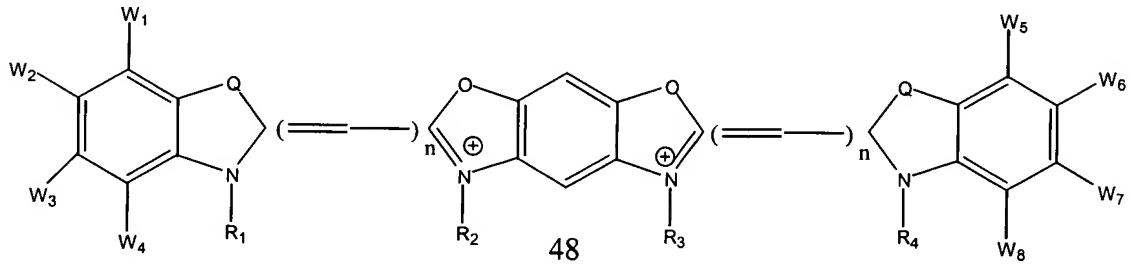
20. A composition comprising the dye of claim 19.

21. A fluorescent cyanine dye having the formula:



wherein R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R_1-R_4 has a reactive group.

22. A fluorescent cyanine dye having the formula:



wherein:

$n \geq 1$;

Q is selected from the group consisting of O, S, CH_2, (CH=CH) and $C(CH_3)_2$;

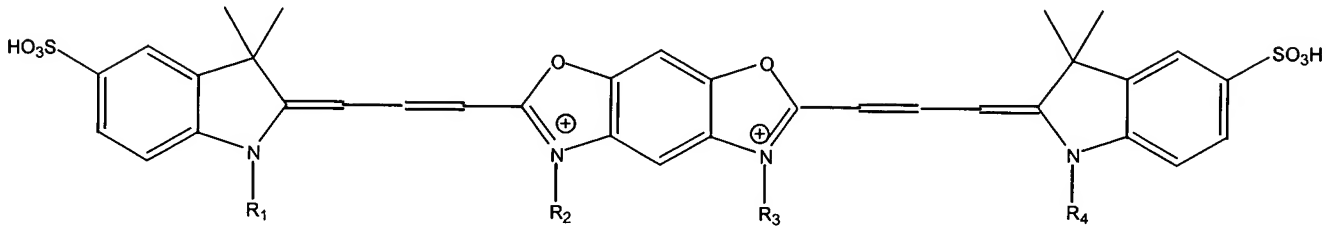
R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R_1-R_4 has a reactive group;

each of W_{1-8} is the same or different and may be H or a hydrophilic moiety; and

at least one occurrence of W is a hydrophilic moiety.

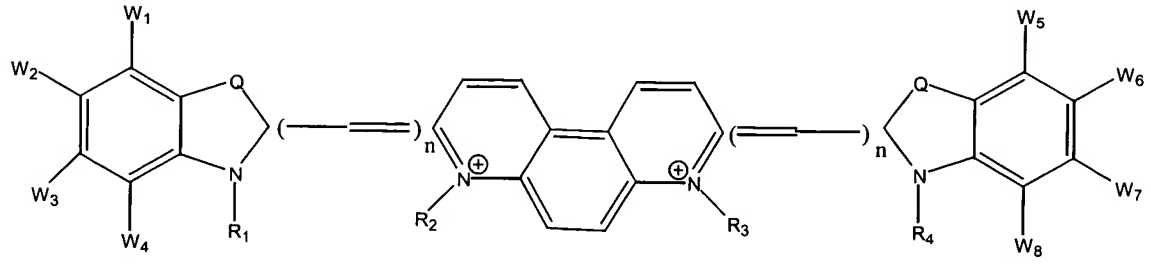
23. A composition comprising the dye of claim 22.

24. A fluorescent cyanine dye having the formula:



wherein R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R_1-R_4 has a reactive group.

25. A fluorescent cyanine dye having the formula:



wherein:

$n \geq 1$;

Q is selected from the group consisting of O, S, CH_2, (CH=CH) and $C(CH_3)_2$;

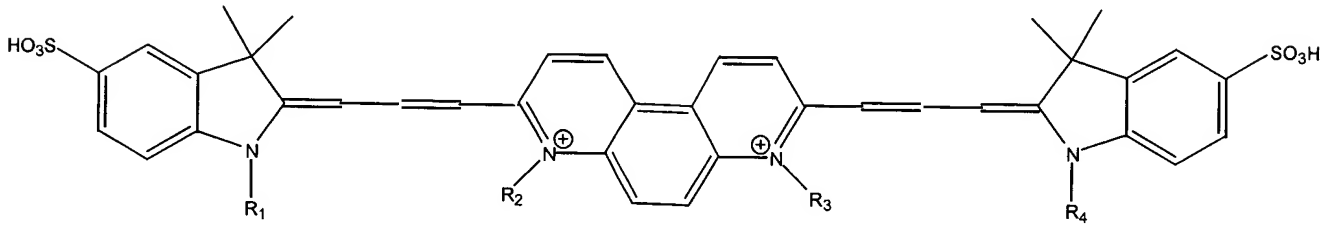
R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R_1-R_4 has a reactive group;

each of W_{1-8} is the same or different and may be H or a hydrophilic moiety; and

at least one occurrence of W is a hydrophilic moiety.

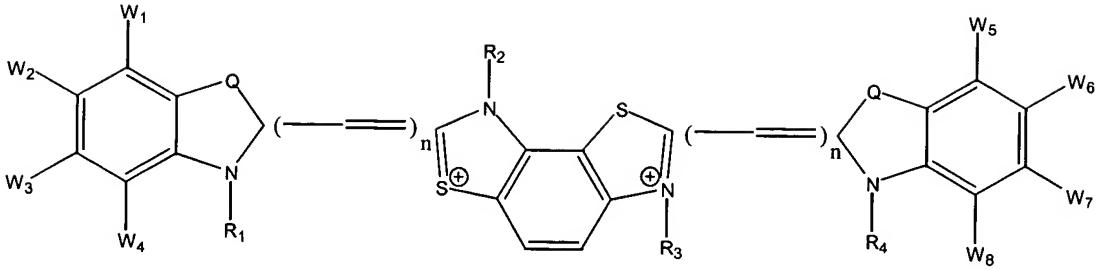
26. A composition comprising the dye of claim 25.

27. A fluorescent cyanine dye having the formula:



wherein R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl, $C(CH_3)_2$ and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R_1-R_4 has a reactive group.

28. A fluorescent cyanine dye having the formula:



wherein:

$n \geq 1$;

Q is selected from the group consisting of O, S, CH_2, (CH=CH) and $C(CH_3)_2$;

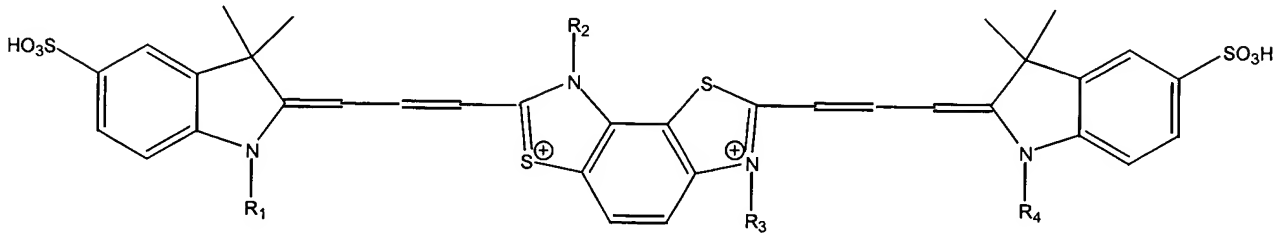
R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R_1-R_4 has a reactive group;

each of W_{1-8} is the same or different and may be H or a hydrophilic moiety; and

at least one occurrence of W is a hydrophilic moiety.

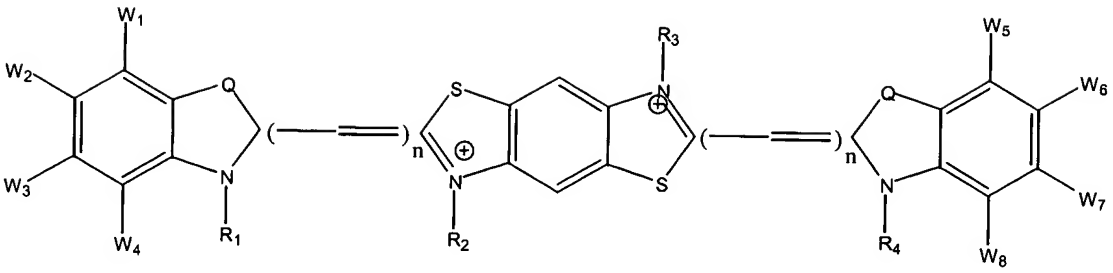
29. A composition comprising the dye of claim 28.

30. A fluorescent cyanine dye having the formula:



wherein R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R_1-R_4 has a reactive group.

31. A fluorescent cyanine dye having the formula:



wherein:

$n \geq 1$;

Q is selected from the group consisting of O, S, CH_2, (CH=CH) and $C(CH_3)_2$;

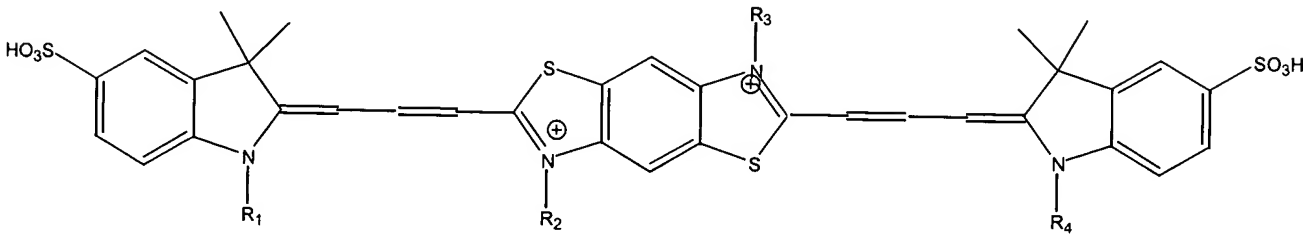
R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R_1-R_4 has a reactive group;

each of W_{1-8} is the same or different and may be H or a hydrophilic moiety; and

at least one occurrence of W is a hydrophilic moiety.

32. A composition comprising the dye of claim 30.

33. A fluorescent cyanine dye having the formula:



wherein R_1-R_4 are the same or different and are selected from the group consisting of H, methyl, ethyl and $(CH_2)_qV$, wherein q is an integer from 1 to 25 and V is a reactive group or H, and at least one of R_1-R_4 has a reactive group.

34. A fluorescent cyanine dye of any one of claims 1, 13, 16, 19, 22, 25 or 28 that comprises a succinimide ester linked to a heterocyclic nitrogen.

35. A nucleoside or nucleotide labeled with a flourescent cyanine dye of any one of claims 1, 13, 16, 19, 22, 25 or 28.

36. A polynucleotide labeled with a flourescent cyanine dye of any one of claims 1, 13, 16, 19, 22, 25 or 28.

37. A polypeptide labeled with a flourescent cyanine dye of any one of claims 1, 13, 16, 19, 22, 25 or 28.

38. A method of labeling a nucleotide or nucleoside, said method comprising contacting a fluorescent cyanine dye of claim 1 with said nucleotide or nucleoside.

39. A method of labeling a nucleic acid, said method comprising contacting a fluorescent cyanine dye of claim 1 with said nucleic acid.

40. The method of claim 39 wherein said nucleic acid comprises an allyl-amine-modified nucleotide, and said dye comprises an NHS group.

41. A method of labeling a polypeptide, said method comprising contacting a fluorescent cyanine dye of claim 1 with said polypeptide.

42. A method of labeling a nucleic acid, said method comprising contacting said nucleic acid with a cis-platinum complex comprising a fluorescent cyanine dye of claim 1.

43. A method of determining a nucleic acid sequence, said method comprising performing a nucleic acid sequencing reaction in the presence of a labeled nucleotide of claim 35.

44. The method of claim 43, wherein said contacting is performed in the presence of a second nucleotide comprising a fluorescent dye that is spectrally distinct from the dye on said first nucleotide.

45. A method of determining a nucleic acid sequence, said method comprising determining a nucleic acid sequence on a nucleic acid comprising a fluorescent cyanine dye of claim 1.

46. A method of detecting a polynucleotide, said method comprising detecting a polynucleotide comprising a labeled nucleotide of claim 35.

47. A method of detecting a polynucleotide, said method comprising detecting a polynucleotide comprising a fluorescent cyanine dye of claim 1.

48. The method of claim 47, wherein said detecting is performed on a nucleic acid microarray.

49. A method of detecting a polypeptide, said method comprising detecting a polypeptide comprising a fluorescent cyanine dye of claim 1.